Asian Journal of Multidisciplinary Studies
Volume 2, Issue 6, June 2014

ISSN: 2321-8819 (Online)
2348-7186 (Print)
Impact Factor: 0.923 (JIF)

Citation analysis of some Ph.D theses approved by Pune University and Bharati Vidyapeeth Deemed University

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ABSTRACT: Citation analysis of the fifteen Ph. D. Theses related to science discipline and approved by Pune University and Bharati Vidyapeeth Deemed University during 1997-2007 has been carried out. More than 3300 citations from these theses were analyzed. These citations include regularly published research journals, scientific periodicals and magazines, monographs, reference books and text books, conference proceedings, other Ph. D. Theses, patents, internets, E-mail etc. Some important conclusions of this citation analysis are (i) more than 80 percent citations are from journals (ii) book citations are next to this and are about 10 percent (iii) citations from previously approved theses are about 6 percent (iv) all other type of citations are 4 percent.

Key Words: *Citation Analysis, Ph. D. Thesis, Pune University and Bharati Deemed Vidyapeeth University*

1.1 Introduction:

Citation analysis refers to a wide ranging area of bibliometrics that studies the citation to and from documents.[1]Citation analysis is a worthwhile research and involves the study of references from one text to another text with information on where that text can be found[2]. Citation analysis is useful for understanding subject relationships, author effectiveness, publication trends etc. Gross and Gross[3] were the first to record citation analysis, who studied the citation patterns to determine the journals to be subscribed to and back volumes to be acquired for the library of Pomona college. They studied the Journal of American chemical society[4]. With citation analysis, one can evaluate and interpret citations received by articles, authors, institutions and other indications of scientific activity[5].

Citations have some special significance in the field of research. The term research itself indicates that what was already known is to be searched again. Therefore, the first step in undertaking any subject for research is to carry out appropriate reference work. The nature of reference work mainly depends on the branch of knowledge whether arts, science, technology, sociology, religions etc. but the basic tasks is the same. That is to search the previously known information, data, literature etc. regarding the subject under study. Through study of citations all reference work previously carried out is noted and recorded which is necessary and useful for the appropriate planning of the research.

1.2 Objectives of the present work:

(a) To determine the principal forms of literature used in the dissertations by doctoral students whose work is related to chemical and allied sciences.

(b) To classify the total citations from the selected doctoral theses in chemical and allied sciences in the disciplinewise and subject wise distribution of the citations

(c) Based on the frequency of use, to prepare the list of citations according to order of merit.

(d) To prepare country wise distributions of the citations.

(e) To study the authorship pattern in citations.

(f) To search any other way/ways of citation analysis useful for research purpose.

1.3 Background and Earlier work:

Boyer[6] who was a doctoral student describes the dissertation as the capstone to a formal academic training process. According to Barry[7] successful doctoral students tends to be comprehensive and up-to-date in receiving the literature.

The first recorded citation analysis was Gross and Gross who determined which chemistry periodicals best served a small college library. The literature reveals that librarians all over the world have used this method to improve their collections. Lal and

Panda[8] prepared a rank list of 100 most frequently cited core periodicals in plant pathology after examining 20 dissertations from the Department of plant pathology at Rajendra Agricultural University. Edward[9] determined which journal titles were used by polymer science and polymer engineering graduate students. Walcott's[10] national study of randomly selected geosciences dissertations revealed that 79.6% of the citations were from serials with nearly 70% of the serials coming from English language publications She suggested that geosciences librarians cut back on purchasing foreign language publications. Mecain and Bobick[12] examined the citation patterns of biology faculty, and studied the core journal needs. These researchers asserted that citation analysis was useful in determining current and future journal use for their library.

An evaluation of the citation analysis literature in science and engineering shows that few bibliometric studies have examined science and engineering literature[11]. Even fewer studies have examined chemistry dissertation to ascertain materials most heavily used. Youngen[12] examined electronic preprints in the astronomy and astrophysics literature and concluded that preprients have become a much more common form of scientific information exchange. To uncover the interdisciplinary nature of scientific disciplines like marine, science, chemistry and biochemistry a systematic study was undertaken by Walcott[13], Hurd[14] and Henkel[15] respectively. According to their studies, citations analysis has been used by librarians in various disciplines to eliminate costly low use/unused journals, purchase needed materials and ascertain core journals needed for patron use and to reveal most active research in a particular area. Further, their study builds on previous studies and seeks to use this method to aid in collection of materials in the areas of chemistry. Ideally, examination of past material use (particularly journals) should suggest future materials by chemistry doctoral students.

Awgela M. Gooden[16] carried out a citation analysis of the doctoral dissertations in the Department of chemistry at the Ohio state university which were accepted during 1996-2000. According to her study the current result corroborate past research by other authors. Journal articles were cited more frequently than monographs.

Recently W. Katherine Mc Cain and James E. Bobick [17] have used citation analysis of faculty publications, doctorial dissertations and preliminary doctoral qualifying briefs produced by faculty and students of the biology department, Temple University (Philadelphia) to assess journal use in the biology library during the years 1975-1977. There were 3739 citations to 336 journals in the combined sources ranking the distribution of citations in each user group ranking and the combined source ranking took the form of a Bradford distribution, sixty highly cited titles were examined in detail. Dissertation citations were dependant on activity of faculty participation in the doctoral program. Citations in qualifying briefs covered a broader range of topics and interests than either of the other two sources. Citations frequencies of volumes published in the periods 1960-1969 and 1970-1977 were examined. The post 1960 citations frequency for 51 titles is 80% or higher several collection maintenance and development decisions have been made based on the results of this study. Citation analysis, according to this study, was shown to be a useful tool in assessing actual and potential journal use by a heterogeneous clientele in a departmental library.

Another recent study on citation analysis of Ph. D. theses was carried out by Shi-Jian Geo, Wang-Zhi Yu and Fengping Luo[18] from Wuhan University, China. In this study 56 Ph. D. theses submitted in 2005 were examined and the authors analyzed 10222 citations in Library and Information Science, Biology, Photogrammetry, Remote sensing and Stomatology. They compared the characteristics of the literature cited in the four disciplines. The results revealed that in biology and Stomatology mainly English language publications were cited where as in the field of library and information science the cited literature came primarily from Chinese sources. In Photogrammetry and remote sensing citations were almost evenly split between Englist and Chinese sources. It was anticipated that appendix with table of the journal titles cited most frequently may be used to evaluate serial holdings and to serve as a guide for students preparing their theses. In addition, the implications for library collection development policies and other technical services were also discussed.

Cost of the journals to be subscribed by academics libraries is also an important factor. Therefore this is preferred by some researchers in the study of citation analysis. Two publications in this respect are worth noting one is due to Chrzastowski, Tina E[19] which is entitled as journal collection, cost effectiveness in academic chemistry library. The other is due to Chrzastowski, Tina E and Brian M[20] oleasko.

Mubeen[21] from Mangalore University (India) examined citations of 22 doctoral dissertation in chemistry submitted to Mangalore University to study the information use pattern of researchers. The application of Bradford's law of scattering to the literature in chemistry reveals an exponential trends when plotted on the graph. The Bradfold's multiplier is seem to observe a geometric series pattern over the literature.

1.4 Methodology:

Fifteen dissertations approved for doctoral degrees and related to chemical and allied sciences by

University of Pune and Bharati Vidyapeeth Deemed University Pune during 1997-2007 are selected for citation analysis. Care is taken to see that most of the important branches of chemical sciences are covered.

All references (bibliographies) were photographed and a list of the selected theses along with the relevant details like titles of the thesis, branch of chemical sciences year of submission etc was prepared.

The total number of citations given in all these fifteen theses was listed and this list of citations is used for citation analysis.

1.5 Data and Analysis:

The data and information obtained for this citation analysis is expressed in tabular form and is summarized in Table 1 to 9.

Table 1: List of the Selected Theses

Sr. No.	Thesis Name	Subject	Name of the Student	Pub. Year
T-1	Effect of Ayurvedic Processing on photochemical and biological profile of some medical plants	Natural Product Chemistry	Mukund M. Naik	2007
T-2	Studies on conducting polymers synthesis and characterization of polymer blends	Polymer Science	Shivkalyan A. Kanhegaokar	2004
T-3	Durability of radiation sterilized polyolefin: stabilization of Ethylene polypropylene copolymer to gamma initiated oxidation	Polymer Science	Sameb Abdulgalil Shahir Thabit	2006
T-4	Structural and reconttitutional studies of acid phosphate erythrin Indica	Biochemistry	Ashish S. Uzagare	2007
T-5	Studies in Chelates of Chromium (III) and Cobalt (III) with some 3-Halo and 3- Methyl lawsone and similar O O Ligands	Inorganic Chemistry	Rahul R. Gokhale	1998
T-6	Structural and Antimicrobial Investigations of Nontranstional and transitional Metal Chelates of 1,2 and 1,4 Naphthoquinone Derivatives	Inorganic Chemistry	Suresh P. Rasale	2004
T-7	Investigation on the Coordination and Analytical Aspect of some Transition metals using Lawsone Derivatives	Analytical and Coordination Chemistry	Sanjay D. Gaikawd	1997
T-8	Synthesis Characterization and Antimicrobial Study of C-3 Methyl and halo Lawsone monoximates of Ho(III), Er (III) Yb(III)	Lanthanides Chemistry	S. B. Jagtap	2001
T-9	Synthesis and Structural Characterization of Transition and Lanthanide Metal Chelates of Isonaphthazain and its Derivatives	Coordination Chemistry	Prasad Khandagale	2003
T-10	Analytical Biological and Coordination Aspects of some Juglone Derivatives	Analytical Chemistry	Aparna N. Mankar	2003
T-11	Structural Investigation of some rare earth juglonates and Prelimainary Pharmacological studies of Isomeric Juglones	Pharmaceutical Chemistry	S. H. Bhosale	1997
T-12	Study of Biologically Active Metal Conjugates of Quinolone and Retinold Analogs	Biochemistry	Sommai Patitun Gaco	2006
T-13	Preparation and Physico Chemical Characterization of the bhasmas of Zinc and Calcium and the Intermediates Obtained During their Synthesis	Catalysis and Inorganic Chemistry	Mahesh Bhagwat	2004
T-14	Nitration of Aromatic Compound over solid Acid Catalysis	Catalysis Chemistry	Sharda Dagade	2002
T-15	Principals and Characterization of $HgCr_2S_4$ and $CdCr_2S_4$ Thin Film using Chemical Method	Physical Chemistry	Vilas V. Todkar	2005

Table 2: Coding of the Selected Theses

Sr. No.	Name of the Student
T-1	Mukund M. Naik
T-2	Shivkalyan A. Kanhegaokar
T-3	Sameb Abdulgalil Shahir Thabit
T-4	Ashish S. Uzagare
T-5	Rahul R. Gokhale
T-6	Suresh P. Rasale
T-7	Sanjay D. Gaikawd
T-8	S. B. Jagtap
T-9	Prasad Khandagale
T-10	Aparna N. Mankar
T-11	S. H. Bhosale
T-12	Sommai Patitun Gaco
T-13	Mahesh Bhagwat
T-14	Sharda Dagade
T-15	Vilas V. Todkar

Table 3: Discipline wise Classification of Selected Ph. D. Theses

Sr. No.	Subject	Quantity
1.	Inorganic Chemistry	06
2.	Organic Chemistry	02
3.	Physical Chemistry	02
4.	Biochemistry	02
5.	Analytical Chemistry	02
6.	Pharmaceutical Chemistry	01
	Total	15

Table 4: Subject wise Classification

Sr. No.	Thesis Name	Subject
T-1	Effect of Ayurvedic Processing on photochemical and biological profile of some medical plants	Natural Product Chemistry
T-2	Studies on conducting polymers synthesis and characterization of polymer blends	Polymer Science
T-3	Durability of radiation sterilized polyolefin: stabilization of Ethylene polypropylene copolymer to gamma initiated oxidation	Polymer Science
T-4	Structural and reconttitutional studies of acid phosphate erythrin Indica	Biochemistry
T-5	Studies in Chelates of Chromium (III) and Cobalt (III) with some 3-Halo and 3- Methyl lawsone and similar O O Ligands	Inorganic Chemistry
T-6	Structural and Antimicrobial Investigations of Nontranstional and transitional Metal Chelates of 1,2 and 1,4 Naphthoquinone Derivatives	Inorganic Chemistry
T-7	Investigation on the Coordination and Analytical Aspect of some Transition metals using Lawsone Derivatives	Analytical and Coordination Chemistry
T-8	Synthesis Characterization and Antimicrobial Study of C-3 Methyl and halo Lawsone monoximates of Ho(III), Er (III) Yb(III)	Lanthanides Chemistry
T-9	Synthesis and Structural Characterization of Transition and Lanthanide Metal Chelates of Isonaphthazain and its Derivatives	Coordination Chemistry

Sr. No.	Thesis Name	Subject
T-10	Analytical Biological and Coordination Aspects of some Juglone Derivatives	Analytical Chemistry
T-11	Structural Investigation of some rare earth juglonates and Prelimainary Pharmacological studies of Isomeric Juglones	Pharmaceutical Chemistry
T-12	Study of Biologically Active Metal Conjugates of Quinolone and Retinold Analogs	Biochemistry
T-13	Preparation and Physico Chemical Characterization of the bhasmas of Zinc and Calcium and the Intermediates Obtained During their Synthesis	Catalysis and Inorganic Chemistry
T-14	Nitration of Aromatic Compound over solid Acid Catalysis	Catalysis Chemistry
T-15	Principals and Characterization of $HgCr_2S_4$ and $CdCr_2S_4$ Thin Film using Chemical Method	Physical Chemistry

Table 5: Classification According to Literature Forms

Sr. No.	Citation	Number	Percentage
1.	Journals	2610	80.82
2.	Books	356	10.18
3.	Theses	222	6.35
4.	Conferences	41	1.17
5.	Patients	39	1.11
6.	Web	12	0.37
	Total	3285	100

Table 6: Number of Ph. D. Theses Referred by Researchers

Sr. No.	Researcher	Number of Ph. D. Theses Referred
1.	Sameb Abdulgalil Shahir Thabit	02
2.	Rahul R. Gokhale	16
3.	Suresh P. Rasale	19
4.	Sanjay D. Gaikawd	13
5.	S. B. Jagtap	24
6.	Prasad Khandagale	24
7.	Aparna N. Mankar	07
8.	S. H. Bhosale	04
9.	Sommai Patitun Gkho	02
	Total	111

Table 7: Patient citation by Researchers

Sr. No.	Researcher	Number
1.	Prasad Khandagale	04
2.	Sanjay D. Gaikawd	22
3.	Suresh P. Rasale	01
4.	Aparna N. Mankar	01
5.	S. P. Dagade	11
	Total	39

Table 8: Books Citations

Sr. No.	Student Code Number	Number of Books
1.	T-1	16
2.	T-2	07
3.	T-3	07
4.	T-4	08
5.	T-5	20
6.	T-6	27
7.	T-7	15
8.	T-8	28
9.	T-9	11
10.	T-10	29
11.	T-11	37
12.	T-12	24
13.	T-13	49
14.	T-14	30
15.	T-15	48
	Total	356

Table 9: Citation of Conference Paper/Abstracts

Sr. No.	Student Code Number	Number
1.	T-2	02
2.	T-4	04
3.	T-8	07
4.	T-9	04
5.	T-10	13
6.	T-11	02
7.	T-14	03
8.	T-15	06
	Total	39

1.5 Conclusions:

A careful examination of the content of these tables with reference to the citation analysis leads to the following general conclusions.

1) The selected doctoral theses in chemical sciences include all the five fundamental branches of chemistry namely Organic Chemistry, Inorganic Chemistry, Physical chemistry, Biochemistry and Analytical Chemistry.

2) There are total 3285 citations recorded in these theses.

3) A critical study of these citation shows that several sub branches of chemistry which are of current interests are covered. Some of these are Natural Product Chemistry, Polymer Science, Lanthanide Chemistry, Catalysis, Medicinal Chemistry, Environmental and Agricultural chemistry, Nano Chemistry Materials chemistry, Nuclear Chemistry etc.

4) Among the 3285 citations, about 80 percent citations are from Journals, next to this are books citations (approx. 10 percent) and previously approved Ph. D. theses (6.4 percent). Remaining Approximately. 3.0 percent cover all other forms of literature like conference proceeding patents, internet etc.

5) The negligible percentage of web citations (0.37 percent) is worth nothing which indicates that researchers involved in this project are mostly unaware and unfamiliar in using internet and the other most modern, fast growing and essential tools for advanced research. This percentage is extremely small as compared to the advance and developed countries where more than 10 percent of the total citations are invariably adopted by researchers.

6) Use of previously approved Ph.D theses as reference tool is remarkable. This indicates that research is chemical sciences is a continuous process and is an extension of the previous research work to make new contributions.

7) Another significant observation is citations from all most all important countries are made although the relative percentage of small countries in minimal. Thus entire world is coming close to each other through scientific research.

8) English is the most common language for reference work but substantial percentage of some other languages is found during this citation analysis. Russian, German, French, Japanese are some of these languages.

9) Citations in Sanskrit, Marathi and Hindi language are also found in this citation analysis due to involvement of ancient branches of knowledge like Ayurved and Unani.

10) Some of the other tools of reference literature which are found in many research articles like unpublished data, personal communications, E-mail communications is totally missing in these 3285 citations.

1.6 Acknowledgement:
Authors are thankful to Prof. Dr. S.S. Kadam, Vice Chancellor, Bharati Vidyapeeth Deemed University,Pune, for providing necessary facilities and constant encouragement.

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